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(21)Application number : 2001-065782 (71)Applicant : CANON INC  
(22)Date of filing : 08.03.2001 (72)Inventor : ISOMURA TETSURO  
MURAKAMI TAKEYA

(54) IMAGING DEVICE AND DEVELOPER-REPLENISHMENT SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an image forming device and a developer replenishment system in which a developer quantity is successively detected with a simple and inexpensive constitution.

SOLUTION: This image forming device 1 possesses (a) a developer replenishment container 300 provided with a developer storing part 301 for storing developer, an aperture part 302 through which the developer is discharged from the developer storing part and a developer transport means 303 for transporting and discharging the developer to/from the aperture part by its rotation, (b) a means 502 for counting the speed of revolution of the developer transporting means 303; and (c) a detection means 501 for detecting the developer quantity in the inside of the developer replenishment container 300, on the basis of the measured speed of revolution of the developer transporting means 303.

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CLAIMS

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[Claim(s)]

[Claim 1] (a) The developer hold section for holding a developer, and opening for discharging a developer from said developer hold section, A developer conveyance means to convey and discharge a developer to said opening by rotating, Image formation equipment characterized by having a preparation \*\*\*\*\* supply container and a detection means to detect the amount of developers in said developer supply container based on the rotational frequency of said developer conveyance means which carried out (b) (c) counting to the means which carries out counting of the rotational frequency of said developer conveyance means.

[Claim 2] Said developer conveyance means is [ other drive systems in said image formation equipment ] image formation equipment of claim 1 with which it drives independently and a developer is supplied to the body supplied [ developer ] from said developer supply container only at the time of the need.

[Claim 3] Said detection means is claim 1 or the image formation equipment of 2 which detects the amount of developers in said developer supply container based on the relation of the rotational frequency of said developer conveyance means and developer discharge which were calculated beforehand.

[Claim 4] Said detection means is image formation equipment of claim 3 which detects the amount of developers in said developer supply container based on the developer discharge data per engine speed of said developer conveyance means called for beforehand.

[Claim 5] Said detection means computes a developer discharge by carrying out the multiplication of the developer discharge data per engine speed of said developer conveyance means called for beforehand to the engine speed of said developer conveyance means which carried out counting. Image formation equipment of claim 4 which computes developer total emission by carrying out accumulation of this developer discharge, and computes the developer residue in said developer supply container by carrying out comparison count of this developer total emission and the initial fill of the developer in said developer supply container called for beforehand.

[Claim 6] Image formation equipment of claim 5 which subtracts said developer total emission from the initial fill of the developer in said developer supply container called for beforehand as said comparison count.

[Claim 7] Furthermore, image formation equipment given in one term of claims 1-6 which have an amendment means for computing the amount of developers actually discharged from said developer supply container according to the change of the amount of developers discharged by rotation of said developer conveyance means accompanying the quiescent time of said developer conveyance means.

[Claim 8] Furthermore, claims 4 and 5 or 6 image formation equipment equipped with an amendment means to amend the error of the developer discharge data per engine speed of said developer conveyance means and the actual developer discharge accompanying the quiescent time of said developer conveyance means.

[Claim 9] Said amendment means is image formation equipment of claim 8 which doubles [ predetermined ] the developer discharge data per engine speed of said developer conveyance means by which a predetermined engine speed is multiplied among the engine speeds of said developer conveyance means which carried out counting according to the quiescent time of said developer conveyance means.

[Claim 10] Said developer conveyance means is image formation equipment given in one term of claims 1-9 which are screw-like members.

[Claim 11] Said developer conveyance means is image formation equipment given in one term of claims 1-9 which are the members which have two or more vanes which extend from the revolving-shaft section.

[Claim 12] A storage means to memorize the data in which the relation between the

engine speed of said developer conveyance means by which said body of equipment was searched for further beforehand, and a developer discharge is shown, A storage means to memorize said computed developer total emission and/or the accumulation rotational frequency of said developer conveyance means which carried out counting, Image formation equipment given in one term of claims 1-13 which have at least one of storage means to memorize the initial fill of the developer in said developer supply container called for beforehand.

[Claim 13] Said developer supply container is image formation equipment given in one term of claims 1-12 used as the removable cartridge to said body of image formation equipment.

[Claim 14] Said cartridge is image formation equipment of claim 13 which has at least one of an electrification means by which said electrophotography photo conductor is charged, a development means to supply a developer to said electrophotography photo conductor, and cleaning means to clean said electrophotography photo conductor further as a process means to act on an electrophotography photo conductor and said electrophotography photo conductor.

[Claim 15] Said cartridge is claim 13 which has at least one of a storage means memorize a storage means memorize the data in which the relation of the engine speed of said developer conveyance means and the developer discharge which were calculated further beforehand is shown, said developer total emission which computed, and/or the accumulation engine speed of said developer conveyance means which carried out counting, and storage means memorize the initial fill of the developer in said developer supply container called for beforehand, or image-formation equipment of 14.

[Claim 16] Said body of equipment is image formation equipment given in one term of claims 1-15 which have an information means for reporting the amount of developers in said detected developer supply container further.

[Claim 17] Said body of equipment is image formation equipment given in one term of claims 1-16 characterized by having a means to transmit to the device which the signal for reporting the amount of developers in said detected developer supply container further was connected possible [ said body of equipment and communication link ], and was equipped with the information means.

[Claim 18] The developer supply system characterized by to detect the amount of developers in the developer supply container which is the developer supply system of image-formation equipment, and was equipped with the developer hold section for holding a developer, opening for discharging a developer from said developer hold section, and a developer conveyance means convey and discharge a developer to said opening by rotating by carrying out counting of the rotational frequency of said developer conveyance means.

[Claim 19] The developer supply system of claim 18 which said developer conveyance means is driven independently with other drive systems of said image formation equipment only at the time of the need, and supplies a developer to the body supplied [ developer ] from said developer supply container.

[Claim 20] the rotational frequency which said body of image formation equipment equipped with the rotational frequency of said developer conveyance means -- counting -- claim 18 which carries out counting with a means, or the developer supply system of 19.

[Claim 21] Claims 18 and 19 or 20 developer supply systems which detect the amount of developers in said developer supply container based on the relation of the rotational frequency of said developer conveyance means and developer discharge which were calculated beforehand.

[Claim 22] The developer supply system of claim 21 which detects the amount of developers in said developer supply container based on the developer discharge data per engine speed of said developer conveyance means called for beforehand.

[Claim 23] The developer supply system of claim 22 which computes developer total emission by computing a developer discharge by carrying out the multiplication of the developer discharge data per engine speed of said developer conveyance means

called for beforehand to the engine speed of said developer conveyance means which carried out counting, and carrying out accumulation of this developer discharge, and computes the developer residue in said developer supply container by carrying out comparison count of this developer total emission and the initial fill of the developer in said developer supply container called for beforehand.

[Claim 24]The developer supply system of claim 23 which subtracts said developer total emission from the initial fill of the developer in said developer supply container called for beforehand as said comparison count.

[Claim 25]Furthermore, a developer supply system given in one term of claims 18-24 which have an amendment means for computing the amount of developers actually discharged from said developer supply container according to the change of the amount of developers discharged by rotation of said developer conveyance means accompanying the quiescent time of said developer conveyance means.

[Claim 26]Furthermore, claims 22 and 23 or 24 developer supply systems equipped with an amendment means accompanying the quiescent time of said developer conveyance means to amend the error of developer discharge data and an actual developer discharge per engine speed of said developer conveyance means.

[Claim 27]Said amendment means is the developer supply system of claim 26 which doubles [ predetermined ] the developer discharge data per engine speed of said developer conveyance means by which a predetermined engine speed is multiplied among the engine speeds of said developer conveyance means which carried out counting according to the quiescent time of said developer conveyance means.

[Claim 28]Said developer conveyance means is a developer supply system given in one term of claims 18-27 which are screw-like members.

[Claim 29]Said developer conveyance means is a developer supply system given in one term of claims 18-27 which are the members which have two or more vanes which extend from the revolving-shaft section.

[Claim 30]A storage means to memorize the data in which the relation between the engine speed of said developer conveyance means by which said body of image formation equipment was searched for further beforehand, and a developer discharge is shown, A storage means to memorize said computed developer discharge and/or the accumulation rotational frequency of said developer conveyance means which carried out counting, A developer supply system given in one term of claims 18-29 which have at least one of storage means to memorize the initial fill of the developer in said developer supply container called for beforehand.

[Claim 31]Said developer supply container is a developer supply system given in one term of claims 18-30 used as the removable cartridge to said body of image formation equipment.

[Claim 32]Said cartridge is the developer supply system of claim 30 which has at least one of an electrification means by which said electrophotography photo conductor is charged, a development means to supply a developer to said electrophotography photo conductor, and cleaning means to clean said electrophotography photo conductor further as a process means to act on an electrophotography photo conductor and said electrophotography photo conductor.

[Claim 33]Said cartridge is claim 31 which has at least one of a storage means memorize the accumulation engine speed of a storage means memorize the data in which the relation of the engine speed of said developer conveyance means and the developer discharge calculated further beforehand is shown, said computed developer total emission, and/or said developer conveyance means, and storage means memorize the initial fill of the developer in said developer supply container called for beforehand, or the developer supply system of 32.

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DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the image formation equipment and the developer supply system which can detect the amount of developers in a developer supply container to serial especially about the developer supply system and image formation equipments in image formation equipment, such as a copying machine which used electrostatic recording, an electrophotography method, etc., and a printer.

[0002]

[Description of the Prior Art] Conventionally, the impalpable powder toner is used for image formation equipments using electrostatic recording, an electrophotography method, etc., such as a copying machine and a printer, as a developer. And in such image formation equipment, toner supply is performed from the developer supply container according to consumption of the developer accompanying image formation.

[0003] Generally the developer supply container is considered as the configuration equipped with developer conveyance means, such as cylindrical, or opening for supplying a toner to a developer from rectangular parallelepiped-like the body of a container, and the body of a container, a closure member which closes this opening, a screw which conveys a toner towards opening from the interior of the body of a container, etc. produced with synthetic resin etc.

[0004] Conventionally, in order to detect that the toner was lost in the developer supply container of such a configuration (toner end), some which established the developer residue detection means are in a developer supply container. As a developer residue detection means, what prepares a piezoelectric device in a supply container and detects a toner directly, the thing to detect using a photosensor, or the thing which measures the electrostatic capacity of a toner is used conventionally.

[0005]

[Problem(s) to be Solved by the Invention] However, the above conventional developer residue detection means must prepare a thing called the antenna (metal rod) for measuring a piezoelectric device, the cleaner which removes the adhesion toner of \*\*\*\*\* in the \*\*\*\*\* list of the transparence for photosensors, or electrostatic capacity in a developer supply container. Therefore, the cost of a container became high and there was a possibility that the running cost of image formation equipment might go up.

[0006] Moreover, even if it used the above conventional developer residue detection means, it was difficult to detect a toner end, for example, to detect the residue of a toner to serial by the ability of a display to only report to an operator.

[0007] Therefore, the purpose of this invention is offering the image formation equipment and the developer supply system which can detect the amount of developers in a developer supply container to serial with a simple and cheap configuration.

[0008] Other purposes of this invention are it not only can transmitting correctly the stage whose developer in a developer supply container is lost to an operator, but offering the image formation equipment and the developer supply system which can transmit the amount of developers in a developer supply container to an operator serial.

[0009]

[Means for Solving the Problem] The above-mentioned purpose is attained by the image formation equipment and the developer supply system concerning this invention. The developer hold section for holding the (a) developer according to the 1st mode of this invention, if it summarizes, Opening for discharging a

developer from said developer hold section, and a developer conveyance means to convey and discharge a developer to said opening by rotating, The image formation equipment characterized by having a preparation \*\*\*\*\* supply container and a detection means to detect the amount of developers in said developer supply container based on the rotational frequency of said developer conveyance means which carried out (b) (c) counting to the means which carries out counting of the rotational frequency of said developer conveyance means is offered.

[0010]The developer hold section for according to the 2nd mode of this invention, being the developer supply system of image formation equipment, and holding a developer, Opening for discharging a developer from said developer hold section, and a developer conveyance means to convey and discharge a developer to said opening by rotating, The developer supply system characterized by detecting the amount of developers in a preparation \*\*\*\*\* supply container by carrying out counting of the rotational frequency of said developer conveyance means is offered.

[0011]According to one embodiment of each above-mentioned this invention, said developer conveyance means is driven independently with the drive system of the others [ time / of the need ] in said image formation equipment, and a developer is supplied to the body supplied [ developer ] from said developer supply container.

[0012]In each above-mentioned this invention, said detection means can detect the amount of developers in said developer supply container based on the relation of the rotational frequency of said developer conveyance means and developer discharge which were calculated beforehand. If it depends like 1 operative condition, said detection means can detect the amount of developers in said developer supply container based on the developer discharge data per engine speed of said developer conveyance means called for beforehand. Said detection means computes a developer discharge by carrying out the multiplication of the developer discharge data per engine speed of said developer conveyance means called for beforehand to the engine speed of said developer conveyance means which carried out counting. Developer total emission is computed by carrying out accumulation of this developer discharge, and the developer residue in said developer supply container is computed by carrying out comparison count of this developer total emission and the initial fill of the developer in said developer supply container called for beforehand. As said comparison count, said developer total emission can be subtracted from the initial fill of the developer in said developer supply container called for beforehand.

[0013]In each above-mentioned this invention, it can have further an amendment means for computing the amount of developers actually discharged from said developer supply container according to the change of the amount of developers discharged by rotation of said developer conveyance means accompanying the quiescent time of said developer conveyance means. If it depends like 1 operative condition, it can have further an amendment means accompanying the quiescent time of said developer conveyance means to amend the error of the developer discharge data per engine speed of said developer conveyance means, and an actual developer discharge. And said amendment means can predetermined double the developer discharge data per engine speed of said developer conveyance means by which a predetermined engine speed is multiplied among the engine speeds of said developer conveyance means which carried out counting according to the quiescent time of said developer conveyance means.

[0014]one operative condition of each above-mentioned this invention -- like -- depending -- if -- said developer conveyance means -- a screw-like member -- it is -- other operative conditions -- when it depends like, said developer conveyance means is a member which has two or more vanes which extend from the revolving-shaft section.

[0015]In each above-mentioned this invention, said body of equipment can have at least one of a storage means memorize a storage means memorize the data in which the relation of the engine speed of said developer conveyance means and the developer discharge which were calculated further beforehand is shown, said

developer total emission which computed, and/or the accumulation engine speed of said developer conveyance means which carried out counting, and storage means memorize the initial fill of the developer in said developer supply container called for beforehand.

[0016] If each above-mentioned this invention is caused like 1 operative condition, said developer supply container is used as the removable cartridge to said body of image formation equipment, and said cartridge can have further at least one of an electrification means by which said electrophotography photo conductor is charged as a process means to act on an electrophotography photo conductor and said electrophotography photo conductor, a development means to supply a developer to said electrophotography photo conductor, and cleaning means to clean said electrophotography photo conductor. Moreover, said cartridge can have at least one of a storage means memorize a storage means memorize the data in which the relation of the engine speed of said developer conveyance means and the developer discharge calculated further beforehand is shown, said computed developer total emission, and/or the accumulation engine speed of said developer conveyance means which carried out counting, and storage means memorize the initial fill of the developer in said developer supply container called for beforehand.

[0017] In the image-formation equipment of above-mentioned this invention, said body of equipment can have an information means for reporting the amount of developers in said developer supply container which detected further, and it can have the means which said body of equipment transmits to the device which the signal for reporting the amount of developers in said developer supply container detected further was connected possible [ said body of equipment and communication link ], and was equipped with an information means.

[0018] the rotational frequency which said body of image formation equipment equipped with the rotational frequency of said developer conveyance means in the developer supply system of above-mentioned this invention -- counting -- counting can be carried out with a means.

[0019]

[Embodiment of the Invention] Hereafter, the image formation equipment and the developer supply system concerning this invention are \*(ed) on a drawing, and are explained in more detail.

[0020] With reference to example 1 drawing 1, one example of the image formation equipment concerning this invention is explained.

[0021] Let image formation equipment 1 be an electrophotography copying machine in this example. The body 100 of equipment is equipped with the cylinder-like \*\*\*\*\* photo conductor (photoconductor drum) 101 as image support. The front face of a photoconductor drum 101 rotated in the direction of an arrow head is uniformly charged with the electrification means (corona-electrical-charging machine) 102. Subsequently, the exposure means (optical system) 103 performs scan exposure according to a manuscript image, and an electrostatic latent image is formed in the front face of a photoconductor drum 101. While the light source E runs, optical system 103 irradiates light at the manuscript G on the manuscript installation base 114, and let it be the image scanner unit which leads the reflected light of the lighting scan light from Manuscript G to up to a photoconductor drum 101 through the mirror system M1, lens system Ln, and the mirror system M2. By the development means 104, a developer (toner) is supplied and the electrostatic latent image formed on the photoconductor drum 101 is visualized as the so-called toner image.

[0022] That is, in this example, the development means 104 is arranged in the buffer (body supplied [ developer ]) 200 and the direction of an arrow head in which a toner is supplied from the developer supply container 300 mentioned later in contact with pivotable roller-like developer support (developing roller) 104a and developing-roller 104a, and has developer thickness specification-part material (developer thickness regulation blade) 104b which sets constant the thickness of the toner supported to developing-roller 104a.

[0023] A toner is supplied to a buffer 200 from the developer supply container

300. In the buffer 200, the developer stirring conveyance members 201, 202, and 203 rotated in the direction of an arrow head, respectively are formed, and it conveys, stirring the toner supplied from the developer supply container 300 to the development means 104.

[0024]While thickness is regulated by developer total thickness specification-part material 104b, frictional electrification is carried out, and it is conveyed to a photoconductor drum 101 and the development section which developing-roller 104a counters. The development bias which usually superimposed DC electrical potential difference on AC electrical potential difference is impressed to developing-roller 104a, and the toner on developing-roller 104a is transferred by the image section of the electrostatic latent image formed on the photoconductor drum 101.

[0025]the record material P, such as a record form contained in the record material stowage 105 on the other hand, -- the record material feed roller 106 and record material conveyance means (conveyance way) 107a -- a resist roller pair -- it is conveyed to 108. and a resist roller pair -- the toner image on a photoconductor drum 101 and a synchronization are taken by 108, and a photoconductor drum 101 and the imprint section which the imprint means 109 counters are supplied. In the imprint section, the toner image on a photoconductor drum 101 is imprinted by the record material P electrostatic in an operation of the imprint means (corona-electrical-charging machine) 109. The record material P which supported the toner image which is not established [ which was imprinted ] is further sent to a fixing assembly 110 by record material conveyance means 107b. The fixing assembly 110 has fixing roller 110a and pressurization roller 110b equipped with the heating means. Here, heat and a pressure are fixed to a non-established toner image on the record material P. then, the record material P on which the image was recorded -- a discharge roller pair -- it is discharged by the tray 113 projected to the exterior of the body 100 of image formation equipment by 111. The photoconductor drum 101 after an imprint process is cleaned by the cleaner 112. A cleaner 112 holds the toner scratched from the photoconductor drum 101 by cleaning-blade 112a which is a cleaning means in waste developer container 112b. In this way, repeat image formation actuation is presented with a photoconductor drum 101.

[0026]Next, the developer residue detection approach in the developer supply system in this example and the developer supply container 300 is explained.

[0027]Drawing 2 shows the longitudinal section of the developer supply container 300 seen from the development means 104 side. The developer supply container 300 is equipped with the developer stirring member (stirring aerofoil) 304 which stirs the toner in the developer hold section 301 by rotating a toner in the developer conveyance means (developer discharge screw) 303 of the shape of a screw moved to the developer supply opening 302, and the direction of an arrow head by rotating in the developer supply opening 302 for discharging a developer to the developer hold section 301 and a buffer 200, and the direction of an arrow head.

[0028]Let the developer supply container 300 be the cartridge which can be detached and attached freely to the body 100 of image formation equipment in this example. The body 100 of equipment is equipped with the developer supply container 300 dismountable through the wearing means 120 with which the body 100 of equipment was equipped. Usually, when it is reported that the toner contained by the developer supply container 300 with an amount of developers serial detection means to mention later was lost, it is exchangeable for the new developer supply container 300. If the body 100 of equipment is equipped with the developer supply container 300, the developer discharge screw (screw) 303 and the stirring aerofoil 304 will be connected to the driving means (not shown) with which the body 100 of equipment was equipped. And with other drive systems within the body 100 of equipment, it drives independently only at the time of the need.

[0029]As shown in drawing 3, the body 100 of image formation equipment has the



control section 500 equipped with CPU501, the developer discharge count circuit 502, etc. In this example, the storage means is formed in the control section 500.

[0030]As a storage means, although not limited, well-known electronic memory can be used suitably. It is possible to take various modes, such as combination of nonvolatile memory, volatile memory, and a backup cell, as memory. In this example, it has ROM503 which memorizes the below-mentioned information set up beforehand, and NVRAM504 which can write in the detection result of a developer residue.

[0031]Moreover, the display 506 is formed in the body 100 of image formation equipment. Furthermore, the interface section 507 for connecting the external instruments 600, such as a personal computer, with the body 100 of image formation equipment possible [ a communication link ] is formed, and it connects with CPU501, respectively.

[0032]As shown in drawing 1, the toner near end detection means (near end detection means) 204 for detecting that it is close to the toner negatively accelerated phosphorescence in a buffer 200 is formed in the inside lower part of a buffer 200. Moreover, the toner restoration detection means (restoration detection means) 205 for detecting having filled up with the toner in the buffer 200 is formed in the inside upper part of a buffer 200. Based on the detection result of these near end detection means 204 and the restoration detection means 205, a toner is supplied to a buffer 200 from the developer supply container 300.

[0033]If the near end detection means 204 outputs the signal which tells that toners run short to CPU501, CPU501 will rotate the screw 303 with which the developer supply container 300 was equipped, will drop a toner through the developer supply opening 302 from the developer hold section 301, and will be supplied to a buffer 200. Moreover, a toner is supplied to a buffer 200 from the developer supply container 300, and it goes, and if the signal which tells having filled up with the toner with the restoration detection means 205 is outputted to CPU501, with directions of CPU501, rotation of a screw 303 will stop and supply of a toner will suspend it.

[0034]As mentioned above, in this example, the stirring aerofoil 304 and screw 303 with which the developer supply container 300 was equipped are considered as the configuration driven independently with other drive systems within the body 100 of image formation equipment only at the time of the need. Moreover, in this example, the stirring aerofoil 304 and a screw 303 are driven to coincidence.

[0035]Moreover, in this example, although a piezo-electric sensor is used as the near end detection means 204 and a restoration detection means 205, this invention is not limited to this and can use especially sensors of the arbitration which can detect toner existence, such as a well-known light transmission type sensor or a sensor using an electrostatic-capacity measurement method, without a limit.

[0036]and the developer supply system of this example has the amount of developers serial detection means which the residue of the toner in the developer supply container 300 other than the near end detection means 204 established in the buffer 200 is boiled serially, and can detect it.

[0037]This amount of developers serial detection means detects the amount of developers in the developer supply container 300 based on rotation of the developer conveyance means (developer discharge screw) 303. That is, the amount of developers serial detection means detects the amount of developers in the developer supply container 300 to serial based on the relation of the rotational frequency of a screw 303 and developer discharge which were calculated beforehand. In this example, an observation determines the developer discharge per rotational frequency of a screw 303 beforehand, it memorizes, and the amount of developers is detected to serial based on this.

[0038]With the image formation equipment 1 of this example, developer discharge data as beforehand shown in drawing 4 by observation are obtained. According to

the graph (straight line without the quiescent time) shown in drawing 4, it turns out that the developer supply container 300 of this example shows the quantum eccentric of a developer. The developer discharge per rotation of a screw 303 is about 2g.

[0039]Therefore, it asks for the developer discharge data per engine speed of a screw 303 by observation beforehand, and memorizes to ROM503 with which the body 100 of image formation equipment was equipped. And a developer discharge is computed by carrying out the multiplication of the developer discharge data per this engine speed to the engine speed of the screw 303 which actually carried out counting. Developer total emission is computed by carrying out accumulation of this developer discharge according to use of the developer supply container 300. And the developer residue in the developer supply container 300 is detectable to serial by carrying out comparison count (for example, subtraction) of the early developer fill and this developer total emission of the developer supply container 300 called for beforehand.

[0040]On the other hand, the amount of developers discharged by rotation of a developer conveyance means in connection with the quiescent time of a developer conveyance means may change. That is, in this example, the developer discharge data per engine speed and the error of an actual developer discharge may arise with a long-term halt of equipment use. This error is the increment in the developer discharge accompanying the increment in the bulk density of the developer by the quiescent time of the developer conveyance means (developer discharge screw) 303. This error can be amended from the correlation data of the rotation hysteresis of the stirring aerofoil 304, and the quiescent time of a screw 303 and a developer eccentric combination for which it asked by observation beforehand.

[0041]That is, with the image formation equipment 1 of this example, as shown in drawing 4, change of the developer discharge per rotational frequency of the screw 303 accompanying the quiescent time of a screw 303 is beforehand called for by observation. Although the developer discharge per same rotational frequency is shown in all the rotational frequency fields of a screw 303 as shown in the graph of "having no quiescent time" if the quiescent time  $t$  of a screw 303 is less than 1 minuteThe quiescent time  $t$ , respectively 1 minute  $<t \leq 5$  minutes (graph for "quiescent-time 5 minutes"), A developer discharge until it rotates 30 times from rotation initiation of a screw 303 increases gradually as it is set to 5 minute  $<t \leq 10$  minutes (graph for "quiescent-time 10 minutes"), and 10 minute  $<t \leq 20$  minutes (graph for "quiescent-time 20 minutes"), and 20 minute  $<t$  (graph "beyond quiescent-time 20 minute").

[0042]As mentioned above, in this example, the stirring aerofoil 304 and a screw 303 drive independently with other drive systems only at the time of the need. That is, as for the stirring aerofoil 304 and a screw 303, the rotation drive only of the between after the near end detection means 204 detects the lack of a toner until the restoration detection means 205 detects toner restoration is carried out. Therefore, at this example, the quiescent time  $t$  of a screw 303 can be recognized by measuring the time amount from detection by the restoration detection means 205 to detection by the near end detection means 204. In this example, CPU501 is equipped with the time amount measurement section (timer), and can measure the quiescent time  $t$ .

[0043]And with the amendment means (amendment program) beforehand set up according to this quiescent time  $t$ , the developer discharge data per engine speed of a screw 303 are amended, and an actual developer discharge is computed from the engine speed which carried out counting to the amended data.

[0044]Amendment of the developer discharge data per [ which is called for beforehand and memorized if the quiescent time  $t$  is less than 1 minute for the amendment program in this example ] engine speed is not performed. Namely, a developer discharge is computed by carrying out multiplication to the inclination as the inclination of the graph of "having no quiescent time" (developer discharge data per engine speed), and the engine speed of the screw 303 by which

counting was carried out among drawing 4.

[0045]and the quiescent time  $t$  -- 1 minute --  $< t \leq 5$  minutes, and 5 minute  $< t \leq 10$  minutes, and 10 minute  $< t \leq 20$  minutes, and 20 minutes --  $< t$  -- when it is  $t$ , the developer discharge data per engine speed by which it multiplies to a predetermined engine speed among the engine speeds of the screw 303 by which counting was carried out are predetermined doubled, respectively. Thereby, the developer discharge computed can be fitted to change of the actual developer discharge accompanying the quiescent time.

[0046]Namely, in this example, when the quiescent time is 1 minute  $< t \leq 5$  minutes, a developer discharge is computed by carrying out multiplication to the rotational frequency of the screw 303 which amended and carried out counting to the inclination which hung 1.2 on the inclination of the graph of "having no quiescent time" among drawing 4 until a screw 303 rotates 30 times. And after a screw 303 rotates 30 times, a developer discharge is computed by carrying out the multiplication of the rotational frequency which carried out counting to the inclination as the inclination of "having no quiescent time."the same -- the quiescent time  $t$  -- 5 minute  $< t \leq 10$  minutes, and 10 minutes --  $< t$  -- in being  $t \leq 20$  minutes, and 20 minute  $< t$ , until a screw 303 rotates 30 times, respectively -- drawing 4 -- multiplication is carried out to the rotational frequency which hung 1.3, 1.4, and 1.5, amended and carried out counting  $R > 4$  inside at the inclination of the graph of "having no quiescent time", respectively. And after rotating 30 times, multiplication is carried out to the inclination of the graph of "having no quiescent time" among drawing 4 with return and the rotational frequency which carried out counting.

[0047]Thus, in this example, an actual developer discharge is computed by amending the developer discharge per [ for which it asked by observation beforehand ] rotational frequency if needed, and carrying out multiplication to the rotational frequency of a screw 303. And developer total emission is computed by carrying out accumulation of the data of the computed developer discharge.

[0048]Although an amendment program is not limited, in this example, it is set as ROM503 and CPU501 carries out operation control according to this program.

[0049]Next, also with reference to the flow chart of drawing 5, drawing 6, and drawing 7, the procedure of the amount of developers serial detection processing in the developer supply container 300 is explained further.

[0050](Rotational frequency counting and quiescent-time measurement) As shown in drawing 5, according to the detecting signal of the near end detection means 204 and the restoration detection means 205, counting of a rotational frequency and the quiescent time  $t$  of a screw 303 are measured. That is, CPU501 supervises that a detecting signal with an insufficient toner is emitted from the near end detection means 204 (S101). If CPU501 detects the signal from the near end detection means 204, measurement of the quiescent time started after the restoration detection means 205 detected toner restoration last time will be stopped (S102). and the rotational frequency with which was made to start rotation of a screw 303 and the developer discharge count circuit 502 was equipped -- counting -- counting of the rotational frequency of the screw 303 by the means is made to start (S103)

[0051]Then, CPU501 supervises that the detecting signal of toner restoration is emitted from the restoration detection means 205 (S104). When CPU501 detects the signal from the restoration detection means 205, measurement of the quiescent time is made to start (S105). and rotation of a screw 303 is suspended -- making -- a rotational frequency -- counting -- counting of the rotational frequency of the screw 303 by the means is stopped (S106).

[0052](Amendment program) As shown in drawing 6, an amendment program amends the developer discharge data per engine speed of the screw 303 beforehand set as ROM503 according to the measured quiescent time. That is, CPU501 recognizes the quiescent time  $t$  (S201), and judges whether the quiescent time  $t$  is less than 1 minute (S202). When the quiescent time  $t$  is less than 1 minute, amendment of the

developer discharge data per [ which was memorized beforehand ] engine speed is not performed, but count of a developer discharge is presented for calculation of the developer discharge by the multiplication means (S203).

[0053]When the quiescent time  $t$  is judged to be longer than 1 minute by decision of S202, subsequently it judges whether the quiescent time is less than 5 minutes (S204). Here, after it hangs and amends 1.2 to the developer discharge data of per the number of rotations and a screw 303 rotates 30 times until a screw 303 rotates 30 times, when it is judged that it is less than 5 minutes, calculation of the developer discharge by the multiplication means is presented, without amending the amount discharge data of developers of per the number of rotations (S205).

[0054]Similarly, when the quiescent time  $t$  is judged to be longer than 5 minutes by decision of S204, in S206 and S208, it judges whether the quiescent time  $t$  is less than 10 minutes, respectively or it is less than 20 minutes. And at each step, the quiescent time  $t$  until a screw 303 rotates 30 times less than 10 minutes, less than 20 or when it is judged that it is longer than 20 minutes. After it hangs and amends 1.3, 1.4, and 1.5 to the developer discharge data per engine speed, respectively and the developer discharge data 303 rotate 30 times. Calculation of the developer discharge by the multiplication means is presented, without amending the amount discharge data of developers per engine speed (S207, S209, S210).

[0055] (Developer residue detection and display) As shown in drawing 7, detection of a developer residue and display processing are performed by the developer discharge count circuit 502, CPU501, etc. namely, the rotational frequency which the developer discharge count circuit 502 equipped with the developer discharge count circuit 502 -- counting -- the rotational frequency of the screw 303 by which counting was carried out with the means is checked (S301). And the multiplication means with which the developer discharge count circuit 502 was equipped is beforehand memorized by ROM503, carries out the multiplication of the developer discharge data per engine speed of the screw 303 amended according to the above-mentioned amendment program if needed, and the engine speed of the screw 303 which carried out counting, and computes a developer discharge. The computed developer discharge is memorized by the storage section which the developer discharge count circuit 502 builds in (S302).

[0056]With an addition means, CPU501 carries out accumulation of the developer discharge memorized by the storage section in the developer discharge count circuit 502 (S303), and writes it in NVRAM504 as a signal of developer total emission (developer consumption in the developer supply container 300) (S304).

[0057]Furthermore, CPU501 computes the present developer residue by carrying out comparison count of the developer fill data in early stages of the developer supply container 300 beforehand set as ROM503, and the developer total emission written in NVRAM504. In this example, the present developer residue is computed by subtracting developer total emission from an early developer fill with a subtraction means (S305).

[0058]CPU501 outputs the signal for reporting the amount of developers in the developer supply container 300 based on the amount data of developers of the present condition acquired by doing in this way, and transmits it to the external instruments (personal computer etc.) 600 connected with the body 100 of image formation equipment possible [ a communication link ] through a display 506 or the interface section 507 if needed. Thereby, the information which reports a developer residue can be displayed on a display 506 or the screen (display) of an external instrument 600 (S306).

[0059]The timing which performs calculation of a developer discharge and developer total emission and calculation of a developer residue can be selected suitably. For example, the accumulation rotational frequency from rotation initiation of a screw 303 to a halt is calculated, this is memorized in the storage section (or NVRAM504) of the developer discharge count circuit 502, after rotation of a screw 303 stops, the multiplication of this accumulation rotational

frequency and the developer discharge data per rotational frequency can be carried out, and a developer discharge can be computed. Or whenever it carries out count rotation of predetermined whenever a screw 303 rotates or, it can carry out.

[0060]The detection information on the amount of developers in the developer supply container 300 obtained in the above procedure is displayed as shown in drawing 8 and drawing 9. In drawing 8 and drawing 9, the amount of developers is reported to an operator by whether the needle 41 which moves according to the amount of developers has indicated the part of gage 42 throat. It may change to a needle 41 and you may display with the bar expanded and contracted according to the amount of developers. Such a display can be displayed on the screen of the terminal units 600, such as the display 506 with which the body 100 of image formation equipment was equipped as an information means, or a personal computer connected with the body 100 of image formation equipment possible [ a communication link ]. Moreover, as shown in drawing 10, the display by direct LED etc. may be prepared in the body of image formation equipment, and LED43 may be blinked according to the amount of developers. Or residue [ of a developer ] %, the remaining weight (g) of a developer, etc. may be displayed numerically, or may be displayed in combination, such as these digital readouts, an above-mentioned gage, and lighting. furthermore, before losing a developer completely, it is the semantics a possibility that the image of predetermined grace may no longer be obtained urges preparation of the developer supply container 300 for exchange to an operator when a until developer decreases to some extent, and, naturally it is also possible to perform the display of a message or warning.

[0061]Moreover, it is not limited to the display on the above-mentioned display 506 and the screen of an external instrument 600, and voice reports, or it records on the record material P, and naturally the information means of the amount of developers can also be outputted. That is, if it is the approach that the amount of developers can be reported to an operator, especially the approach will not be limited.

[0062]Here, it is not limited to displaying about all fields until a developer disappears from the condition of having not necessarily filled up detecting serially the amount of developers in the developer supply container 300, and displaying it with the developer in the developer supply container 300 at full. Namely, as it mentions above and explained, accumulation of the total emission (developer consumption) of a developer is carried out serially, and it is memorized, and the period until a developer disappears from the time of a developer becoming for example, below one half may be displayed. moreover, a developer -- being lost (a toner -- and) -- although only the condition that a developer disappears completely from the inside of a developer supply container is not meant and some developer remains, the condition of decreasing, so that good image formation cannot be desired is also included.

[0063]Immediately after powering on of image formation equipment 1, the information on a developer residue can be reported immediately, without waiting to newly compute a developer residue according to an above-mentioned procedure using the initial fill data of the developer of the developer supply container 300 memorized by the developer total emission memorized by NVRAM504 and ROM503.

[0064]Although NVRAM504 was made to memorize the computed developer total emission in \*\*\*\*, NVRAM504 may be made to memorize the information on the computed developer residue. Moreover, it is good also as a configuration which carry out accumulation of the turnover number of the developer conveyance means (screw) 303 which carried out counting, and NVRAM504 is made to memorize, and computes a developer residue using this information.

[0065]Thus, an operator can know the amount of developers in the developer supply container 300 to serial. Moreover, since the exact stage of the toner end of the developer supply container 300 can be known, the developer supply container 300 can be exchanged at a proper stage, and the developer supply container for

exchange can be prepared at a suitable stage. Thereby, an operator's convenience can be improved.

[0066] In addition, although the amendment program applied and amended the predetermined multiplier to the developer discharge data per [ which was memorized beforehand ] engine speed in this example according to the quiescent time of the developer conveyance means (screw) 303, this invention is not limited to this. For example, the multi-statement of the developer discharge data per engine speed can be carried out beforehand, and a storage means can be made to memorize according to the quiescent time of a screw 303. And according to the quiescent time of the detected screw 303, the developer discharge data per engine speed by which it multiplies to a predetermined engine speed among the engine speeds of the screw 303 by which counting was carried out are chosen suitably, and are used. Then, developer total emission and a developer residue are computed like \*\*\*\*.

[0067] Furthermore, the storage means (ROM503) was made to memorize the developer discharge data per engine speed beforehand in this example as data in which the relation between the engine speed of the developer conveyance means (screw) 303 and a developer discharge is shown. However, this invention is not limited to this and a storage means can also be made to memorize it by using as a function or a table relation of the engine speed of a screw 303 and developer discharge which were calculated beforehand. And a developer discharge can be calculated by using this relation from the rotational frequency of the screw 303 which carried out counting. In this case, the developer discharge calculated from the above-mentioned relation can be predetermined doubled about a predetermined rotational frequency among the rotational frequencies of the screw 303 which carried out counting as an amendment means established since it corresponds to change of the developer discharge accompanying the quiescent time of a screw 303. Or the multi-statement of the relation between the rotational frequency of a screw 303 and a developer discharge can be carried out beforehand, the storage means can be made to be able to memorize according to the quiescent time of a screw 303, and this can also be chosen and used according to the quiescent time of the detected screw 303. Then, developer total emission and a developer residue are computed like \*\*\*\*.

[0068] According to the configuration of this example, in the developer supply container 300 As mentioned above, for example, a piezoelectric device, The cleaner excluding the adhesion toner of \*\*\*\*\* to the transparent \*\*\*\*\* list for photosensors, Or, without having special detection means, such as an antenna (metal rod) for measuring electrostatic capacity With a simple and cheap configuration, it not only can transmit the exact stage of the toner end in the developer supply container 300 to an operator, but it becomes possible to transmit the residue of the developer in a developer supply container to an operator serial. It becomes possible to lower the cost of a developer supply container and to aim at reduction of the running cost of image formation equipment by this.

[0069] An example 2, next other examples of this invention are explained. As shown in drawing 11, the image formation equipment 2 of this example is considered as the same configuration as the image formation equipment 1 of an example 1, and an outline. Therefore, the same sign is given to the element which has the same function as the image formation equipment 1 of an example 1, and a configuration, and detailed explanation is omitted.

[0070] The image formation equipment 2 of this example has the developer supply container 400, and supplies a developer (toner) to a buffer 200 from the developer supply container 400 like an example 1. The toner supplied to the buffer 200 from the developer supply container 400 is conveyed the developer stirring conveyance members 201 and 202 rotated in the direction of an arrow head, respectively stirring, and is supplied to the development means 104.

[0071] Next, the developer residue detection approach in the supply system of the developer in this example and the developer supply container 400 is explained.

[0072] Drawing 12 shows the longitudinal section of the developer supply container seen from development means 14 direction. The developer supply container 400 is equipped with a developer conveyance means (developer stirring discharge aerofoil) 403 to convey towards the developer supply opening 402, by rotating in the developer supply opening 402 for discharging a developer to the developer hold section 401 and a buffer 200, and the direction of arrow-head C, stirring a developer. The developer stirring discharge aerofoil (discharge aerofoil) 403 is a member which has two or more vane 403b which extends from shank 403a, and has the conveyance ability of an arrow head A and the direction of B by carrying out stirring rotation. Thereby, the developer in the developer hold section 401 is conveyed in the direction of [ from longitudinal direction both ends ] the developer supply opening 402, and is discharged through the developer supply opening 402 to a buffer 200.

[0073] Let the developer supply container 400 of this example be the cartridge which can be detached and attached freely to the body 100 of image formation equipment like the example 1. The body 100 of equipment is equipped with the developer supply container 300 dismountable through the wearing means 120 with which the body 100 of equipment was equipped. Usually, when it is reported that the toner contained by the developer supply container 400 with an amount of developers serial detection means to mention later was lost, it is exchangeable for the new developer supply container 300. If the body 100 of equipment is equipped with the developer supply container 400, the discharge aerofoil 403 will be connected to the driving means (not shown) with which the body 100 of equipment was equipped. And with other drive systems within the body 100 of equipment, it drives independently only at the time of the need.

[0074] The image formation equipment 2 of this example has the control section 500 which equipped the body 100 of equipment with CPU501, the developer discharge count circuit 502, etc., as shown in drawing 13. Moreover, in this example, the storage means is formed in the control section 500.

[0075] As a storage means, what was explained in the example 1, and the same thing can be used. In this example, it has ROM503 which memorizes the information set up beforehand, and NVRAM504 which can write in the detection result of a developer residue.

[0076] Moreover, the display 506 is formed in the body 100 of equipment. Furthermore, the interface section 507 for connecting the external instruments 600, such as a personal computer, with the body 100 of image formation equipment possible [ a communication link ], for example is formed, and it connects with CPU501, respectively.

[0077] The near end detection means 204 is formed in the inside lower part of a buffer 200 like the example 1. With outputting the signal which tells that the toner runs short of this near end detection means 204 to CPU501, the discharge aerofoil 403 with which the developer supply container 400 was equipped rotates CPU501. Thereby, a toner is dropped through the developer supply opening 402 from the developer hold section 401, and a buffer 200 is supplied. Moreover, the restoration detection means 205 is formed in the inside upper part of a buffer 200. If a toner is supplied to a buffer 200 from the developer supply container 400 and it goes, the signal which tells having filled up with the toner with the restoration detection means 205 soon will be outputted to CPU501, rotation of the discharge aerofoil 403 will stop with directions of CPU501, and supply of a toner will be stopped.

[0078] As mentioned above, according to this example, the discharge aerofoil 403 with which the developer supply container 400 was equipped is considered as the configuration driven independently with other drive systems of the body 100 of image formation equipment only at the time of the need.

[0079] In this example, although a piezo-electric sensor is used as the near end detection means 204 and a restoration detection means 205, this invention is not limited to this and can use especially the sensor of the arbitration which can detect toner existence, such as a well-known light transmission type sensor or a

sensor using an electrostatic-capacity measurement method, without a limit.

[0080]and the developer supply system of this example has the amount of developers serial detection means which the residue of the toner in the developer supply container 400 other than the near end detection means 204 established in the buffer 200 is boiled serially, and can detect it. The principle of the same this invention as an example 1 is applied to the amount of developers serial detection means of this example. That is, the amount of developers serial detection means detects the amount of developers in the developer supply container 400 based on the rotational frequency of the developer conveyance means (developer stirring discharge aerofoil) 403.

[0081]Here, the image formation equipment 2 of this example differs in the developer supply container 300 explained in the example 1, and does not have the quantum eccentric of a developer. However, the developer discharge data beforehand shown in drawing 1414 by observation are obtained. The developer discharge per rotational frequency of the discharge aerofoil 403 is computable from the relation between such a rotational frequency of the discharge aerofoil 403, and a developer discharge.

[0082]Therefore, it asks for the developer discharge data per engine speed of the discharge aerofoil 403 by observation beforehand, and memorizes to ROM503 with which the body 100 of image formation equipment was equipped. And a developer discharge is computed by carrying out the multiplication of the developer discharge data per this engine speed to the engine speed of the discharge aerofoil 403 which actually carried out counting. Developer total emission is computed by carrying out accumulation of this developer discharge according to use of the developer supply container 400. And the amount of developers in the developer supply container 400 is detected to serial by carrying out comparison count (for example, subtraction) of the early developer fill and this developer total emission of the developer supply container 40 called for beforehand.

[0083]Also in the image formation equipment 2 of this example, the amount of the developer discharged by rotation of a developer conveyance means in connection with the quiescent time of a developer conveyance means may change. That is, in this example, the developer discharge data per engine speed of the discharge aerofoil 403 and the error of an actual developer discharge may arise with a long-term halt of equipment use. As mentioned above, this error is the increment in the developer discharge accompanying the increment in the bulk density of the developer by the quiescent time of the discharge aerofoil 403. Usually, the amount of developer supply until predetermined carries out rotational frequency rotation increases after rotation initiation of the developer stirring conveyance aerofoil 403. This error can be amended according to the same amendment program as what was explained in the example 1 from the correlation data of the quiescent time of the discharge aerofoil 403, and a developer eccentric combination for which it asked beforehand.

[0084]the rotational frequency of the discharge aerofoil 403 in the image formation equipment 2 of this example -- measurement processing of counting and the quiescent time can be made to be the same as that of the case of the image formation equipment 1 of an example 1 explained with reference to drawing 5. Moreover, suppose that it is the same as that of an amendment program and the amount detection of developers, the example 1 explained with reference to drawing 6 and drawing 7 also about the procedure of display processing, and an outline.

[0085]As mentioned above, also in the developer supply container 400 which does not have the quantum eccentric of a developer, a developer residue can be detected to serial and the residue of a developer can always be transmitted to an operator. Moreover, the exact stage of the toner end in the developer supply container 400 can be transmitted to an operator with a simple and cheap configuration, without equipping the developer supply container 400 with special detection means, such as an antenna (metal rod) for measuring the cleaner except



the adhesion toner of \*\*\*\*\*, or electrostatic capacity, at the transparent \*\*\*\*\* list for a piezoelectric device and photosensors according to this example. Thereby, the cost of a developer supply container can be lowered and the running cost of image formation equipment can be reduced.

[0086]The example 3 above-mentioned examples 1 and 2 explained the storage means (ROM, NVRAM) as what is prepared only in the body 100 of image formation equipment.

[0087]In this example, a storage means is formed in a developer supply container removable on the body 100 of image formation equipment.

[0088]As a storage means, although not limited, well-known electronic memory can be used suitably. It is possible to take various modes, such as combination of nonvolatile memory, volatile memory, and a backup cell, as memory. The storage means formed in the developer supply container is in the condition which equipped the body 100 of image formation equipment with the developer supply container, and it connects with CPU501 prepared in the control section 500 of the body 100 of image formation equipment, and it will be in the condition which can communicate.

[0089]For example, if it is based on the image formation equipment 1 of an example 1 and explains, as shown in drawing 15, the function of NVRAM504 in an example 1 can be given to the storage means of the developer supply container 300. Thereby, the information on the rotational frequency of the developer total emission (developer consumption in the developer supply container 300) of the computed developer supply container 300 or a developer residue, and the developer conveyance means (screw) 303 can be made to hold to developer supply container 300 self. Also when removing the developer supply container 300 from the body 100 of equipment and using by another body 100 of equipment by this, the developer total emission (developer residue) about each developer supply container 300 can be recognized by the body 100 side of equipment.

[0090]Furthermore, as shown in drawing 16, the function of ROM503 in an example 1 can also be given to the storage means formed in the developer supply container 300. The information on the developer discharge data per [ which was based more on the property of each developer supply container 300 ] engine speed and/or the initial fill of a developer can be made to hold to developer supply container 300 self by this like every manufacture lot of each developer supply container 300 or a developer supply container. Furthermore, the amendment program according to the developer supply container 300 may be made to memorize.

[0091]The image formation equipment of this example is considered as the same configuration as examples 1 and 2 except for a storage means being formed in the developer supply container 300. Therefore, the explanation given in the examples 1 and 2 here is used, and detailed explanation is omitted.

[0092]As mentioned above, according to the configuration of this example, serial detection of a developer residue according to the property of each developer supply container 300 can be performed more. Moreover, it can respond also to modification of the initial fill of a developer by the design change of the some of the developer supply container 300, developer discharge data, etc.

[0093]In addition, although it was explained in each above-mentioned example that the developer supply container 300,400 was alone used as the removable cartridge to the body 100 of image formation equipment, this invention is not limited to this. It includes in the process cartridge which cartridge-ized in one at least one and the electrophotography photo conductor of the electrification means 102 as a process means to act on the electrophotography photo conductor (photoconductor drum) 101, the development means 104, and cleaning means 112a in one, and the developer supply container 300,400 can also suppose at the body of image formation equipment that it is removable. Also in this case, a storage means can be formed in a process cartridge like an example 3.

[0094]Furthermore, naturally the developer supply container 300,400 can apply this invention also to the image formation equipment placed in a fixed position

by the body 100 of image formation equipment. In this case, what is necessary is just to supplement the developer supply container 300,400 with a developer with a developer supplement means (not shown) according to the reported developer residue.

[0095] In each above-mentioned example, when the restoration detection means 205 outputted the signal which tells having filled up with the toner in the buffer 200, it explained rotation of the developer conveyance means 303 and 403 having been substantially suspended by coincidence, and having stopped the toner supply to a buffer 200 from the developer supply containers 300 and 400. However, this invention is good also as a configuration suspended after the developer conveyance means 303 and 304 carry out predetermined time rotation, after it is not limited to this and the restoration detection means 205 emits the signal which tells having filled up with the toner. In this case, the quiescent time of the developer conveyance means 303 and 403 can be judged from detection of the toner restoration by the restoration detection means 205 as time amount which deducted this predetermined time.

[0096]

[Effect of the Invention] As explained above, the image formation equipment of this invention (a) The developer hold section for holding a developer, and opening for discharging a developer from the developer hold section, A developer conveyance means to convey and discharge a developer to opening by rotating, A preparation \*\*\*\*\* supply container and the means which carries out counting of the rotational frequency of (b) developer conveyance means, (c) It considers as the configuration which has a detection means to detect the amount of developers in a developer supply container based on the rotational frequency of the developer conveyance means which carried out counting. Moreover, the developer supply system of this invention The developer hold section for holding a developer, and opening for discharging a developer from the developer hold section, Since it considers as the configuration which detects the amount of developers in the developer supply container equipped with a developer conveyance means to convey and discharge a developer to opening by rotating, by carrying out counting of the rotational frequency of a developer conveyance means With a simple and cheap configuration, the amount of developers in a developer supply container is detectable to serial. It not only can transmit correctly the stage whose developer in a developer supply container is lost to an operator, but according to this invention, it can transmit the amount of developers in a developer supply container to an operator serial.

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#### DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the outline cross-sectional view of one example of the image formation equipment concerning this invention.

[Drawing 2] It is outline drawing of longitudinal section of the developer supply container with which the image formation equipment of drawing 1 was equipped.

[Drawing 3] It is the system block Fig. showing one example of the image formation equipment concerning this invention.

[Drawing 4] It is the graphical representation showing an example of the developer discharge data of a developer supply container.

[Drawing 5] the engine speed of the developer conveyance means in one example of the image formation equipment concerning this invention -- it is a flow chart Fig. for explaining counting and quiescent-time measurement.

[Drawing 6] It is a flow chart Fig. for explaining the amendment program of the developer discharge data per engine speed of the developer conveyance means in one example of the image formation equipment concerning this invention.

[Drawing 7] It is a flow chart Fig. for explaining the amount of developers serial detection in one example of the image formation equipment concerning this invention, and a display.

[Drawing 8] It is drawing showing an example of the amount display of developers.

[Drawing 9] It is drawing showing other examples of the amount display of developers.

[Drawing 10] It is drawing showing the example of further others of the amount display of developers.

[Drawing 11] It is the outline cross-sectional view of other examples of the image formation equipment concerning this invention.

[Drawing 12] It is outline drawing of longitudinal section of the developer supply container with which the image formation equipment of drawing 11 was equipped.

[Drawing 13] It is the system block Fig. of other examples of the image formation equipment concerning this invention.

[Drawing 14] It is the graphical representation showing other examples of the developer discharge data of a developer supply container.

[Drawing 15] It is the system block Fig. showing other examples of the image formation equipment concerning this invention.

[Drawing 16] It is the system block Fig. showing other examples of the image formation equipment concerning this invention.

[Description of Notations]

100 Body of Image Formation Equipment

101 Electrophotography Photo Conductor (Photoconductor Drum, Image Support)

102 Electrification Means

103 Exposure Means

104 Development Means

109 Imprint Means

110 Fixing Assembly

200 Buffer (Body Supplied [ Developer ])

300 Developer Supply Container

301 Developer Hold Section

302 Developer Supply Opening

303 Developer Conveyance Means (Developer Discharge Screw, Screw)

304 Developer Stirring Member (Stirring Aerofoil)

400 Developer Supply Container

401 Developer Hold Section

402 Developer Supply Opening

403 Developer Conveyance Means (Developer Stirring Discharge Aerofoil, Discharge Aerofoil)

500 Control Section (Body Side Operation Part of Equipment)

501 CPU

502 Developer Discharge Count Circuit

503 ROM (Storage Means)

504 NVRAM (Storage Means)

506 Display (Information Means)

507 Interface Section

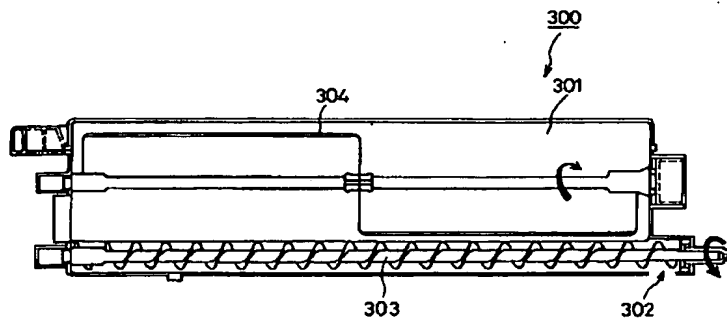
600 External Instrument (Personal Computer)

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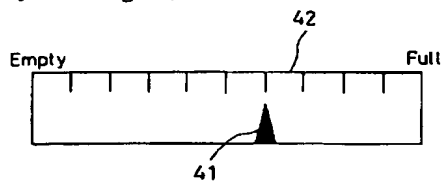
## DRAWINGS

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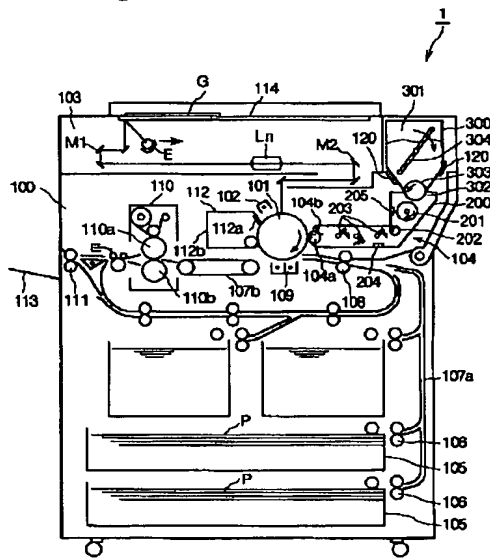
[Drawing 2]



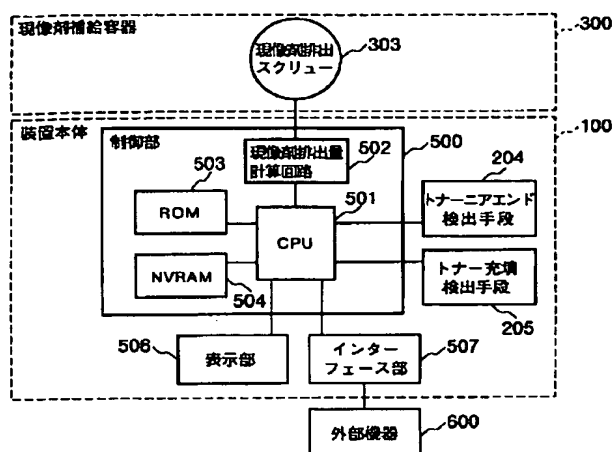
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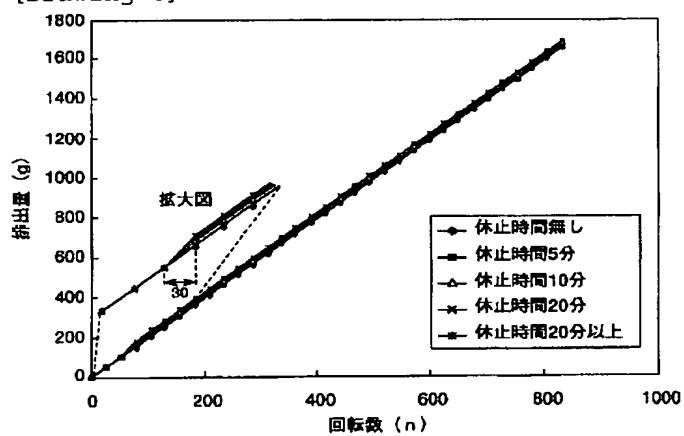
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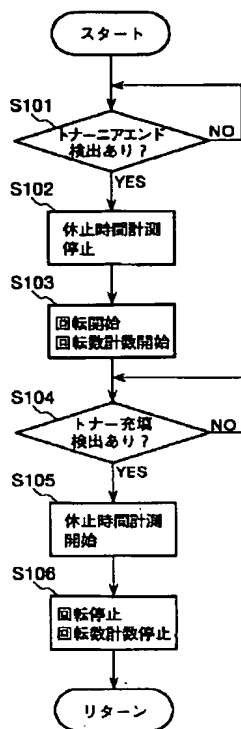
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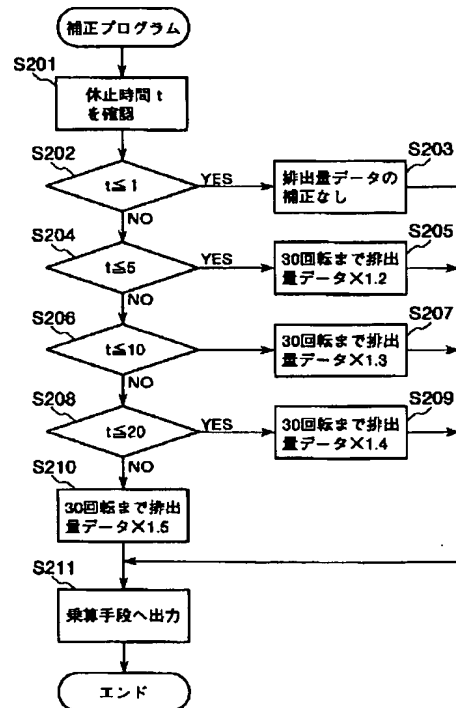
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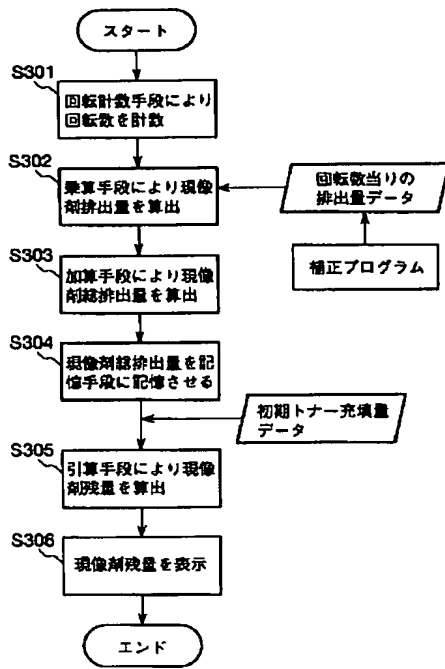
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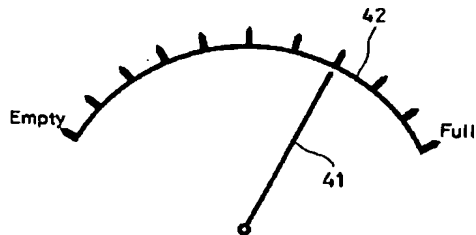
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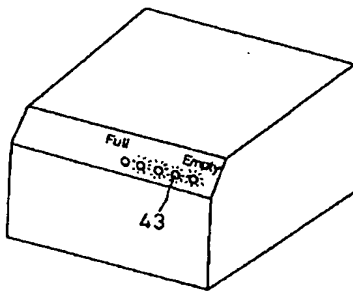
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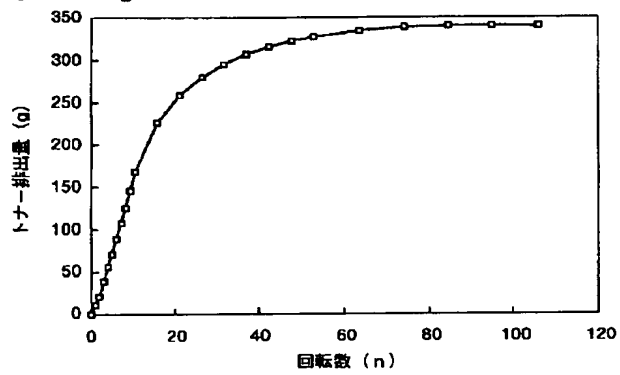
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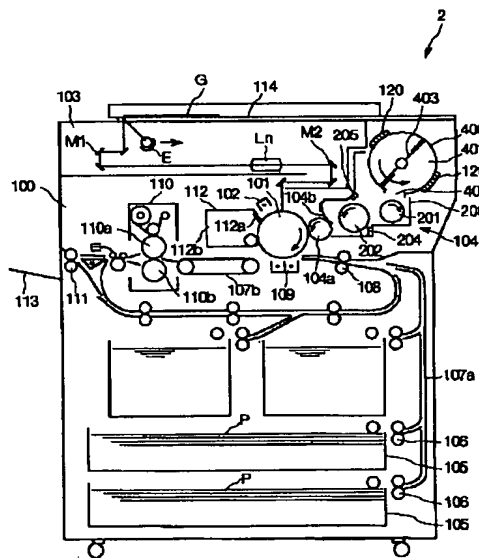
[Drawing 10]



[Drawing 14]

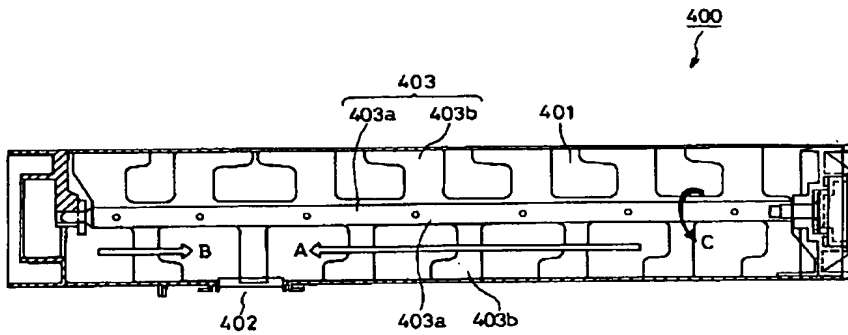


[Drawing 11]

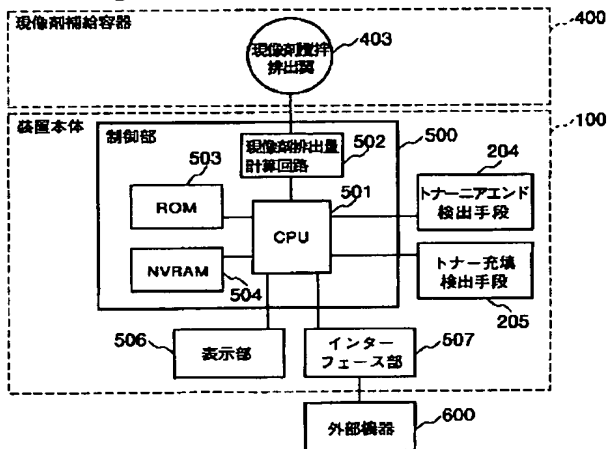


[Drawing 12]

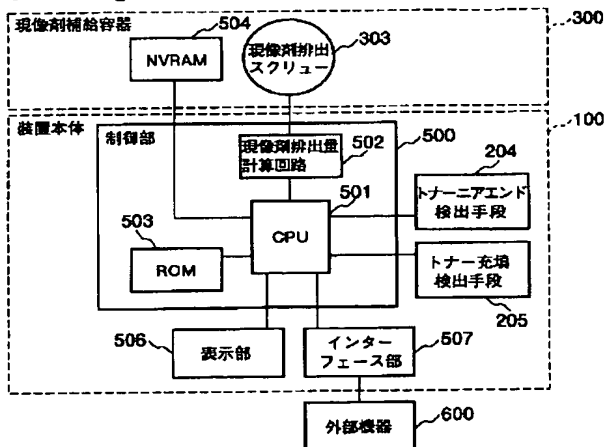




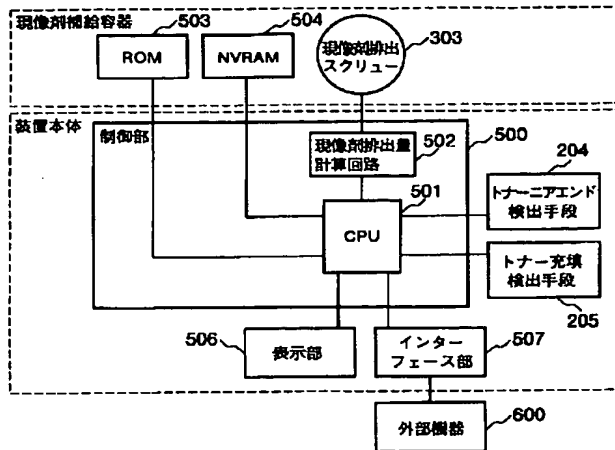
[Drawing 13]



[Drawing 15]



[Drawing 16]



(19)



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(71) Applicant: **CANON INC**

(72) Inventor: **ISOMURA TETSURO**  
**MURAKAMI TAKEYA**

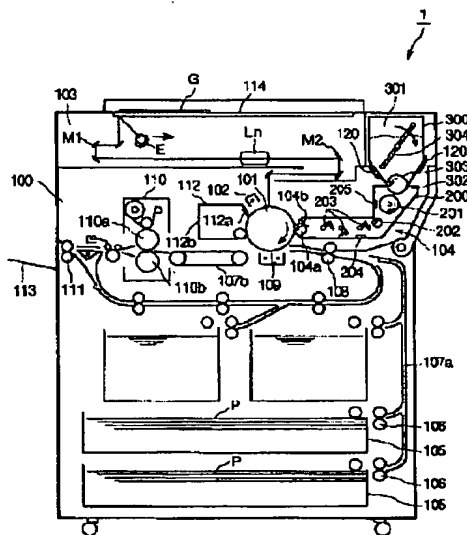
(54) **IMAGING DEVICE AND  
DEVELOPER-REPLENISHMENT SYSTEM**

(57) Abstract:

**PROBLEM TO BE SOLVED:** To provide an image forming device and a developer replenishment system in which a developer quantity is successively detected with a simple and inexpensive constitution.

**SOLUTION:** This image forming device 1 possesses (a) a developer replenishment container 300 provided with a developer storing part 301 for storing developer, an aperture part 302 through which the developer is discharged from the developer storing part and a developer transport means 303 for transporting and discharging the developer to/from the aperture part by its rotation, (b) a means 502 for counting the speed of revolution of the developer transporting means 303, and (c) a detection means 501 for detecting the developer quantity in the inside of the developer replenishment container 300, on the basis of the measured speed of revolution of the developer transporting means 303.

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